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THREE NEW SPECIES OF THE *EVIOTA EPIPHANES* GROUP HAVING VERTICAL TRUNK BARS (PISCES: GOBIIDAE)

Susan J. Karnella and Ernest A. Lachner

Abstract.—Three new species of gobiid fishes of the genus *Eviota* Jenkins from Indo-Pacific marine waters are described, namely, *E. disrupta, E. fasciola,* and *E. irrasa*. These species are related to the *E. epiphanes* group, sharing a number of meristic and morphological characters, including the cephalic sensory pore system. They are distinguished from each other and from *E. epiphanes* by the presence, size, shape, and intensity of particular color marks, especially the dark mark or marks on the fleshy base of the pectoral fin, and the dark vertical bars on the trunk. The salient differences in the color patterns of preserved specimens of these four allopatric species are compared and illustrated, and their distributions are plotted on a map.

In this study we treat three new species that resemble *Eviota epiphanes* Jenkins in certain color characters and share many meristic and morphological characters (Group I, Lachner and Karnella, 1980). The shared characters are: complete sensory pore system for *Eviota*; branching of certain pectoral rays; male genital papilla nonfimbriate; vertebrae total 26; dorsal-anal fin ray formula 9/8; pelvic fin rays always I,4; interradial pelvic fin membrane reduced; segments between consecutive branches of the fourth pelvic fin ray usually 1; no elongation of the first dorsal fin; and five ventral midline spots. These four species may superficially resemble each other in preserved color pattern, depending upon the state of preservation or degree of development of particular color marks. These similarities may be observed in the following characters: the presence of bars dorsally on the head and nape; the presence of at least short bars or saddles along the dorsal midline of the trunk; the head, laterally and ventrally, having large scattered chromatophores, often arranged in clusters forming spots; caudal peduncle with a well developed dark subcutaneous spot that is integrated with a weak to strong subcutaneous vertical bar; and the first dorsal fin with a dark, irregularly mottled or barred pattern.

We find that meristic and morphometric characters are not useful in distinguishing these species. The discriminating characters segregating the species are specific color marks, primarily the type of mark on the fleshy base of the pectoral fin and the development, uniformity, and intensity of the vertical trunk bars. Color differences of the 3 new species and *E. epiphanes* are shown in Table 1.

Table 1.—Differences in color pattern among four species of the *Eviota epiphanes* group.

Character	*epiphanes*	*fasciola*	*disrupta*	*irrasa*
Development and description of mark on fleshy pectoral fin base	weak; few chromatophores on upper portion	well developed; single large spot; kidney shaped to semicircular	well developed; two spots; circular; discrete	well developed; two spots; oval to circular; not discrete
Intensity of pectoral base mark compared to other body pigmentation	equal to or less than	darker than	darker than	equal to
Development of trunk bars:				
length	reduced to saddles	to lower body	to lower body	at most, to lower body anteriorly, to upper body posteriorly
discreteness	not applicable	discrete	discrete	not discrete
uniformity	not applicable	uniform	interrupted anteriorly	uniform
Branchiostegal mark	absent	present	present	present
Scale pocket pigmentation	present; well developed	absent	absent	present; weakly developed
Pale area on posterior opercle and anterior pectoral base	absent	present	present	present

Methods

The methods of obtaining counts and measurements and the presentation of these data are given by Lachner and Karnella (1978, 1980). Detailed analysis of particular color marks was accomplished by recording pertinent data for each specimen. The specific color marks investigated were the following: dark mark on fleshy base of pectoral fin, its shape, intensity, if double or single, and relative size; transverse bars on head, dorsally, and nape, their intensity, density (whether less dense centrally than marginally), continuity over dorsal midline, if broken into spots laterally, or more intensely pigmented laterally; dark vertical bars on trunk, their discreteness (if sharply separated from pale interspaces), uniformity (if complete bars or broken laterally into vertical, oblong marks), continuity over dorsal midline, length of bars from dorsal midline ventrally, width of bars relative to pale interspaces, density of bars, and presence of two narrow bars at base of caudal fin; presence of pigmentation on the scale pockets, and the integration of this pigmentation with the trunk bars; presence of scattered chromatophores, clusters of chromatophores forming spots, or intermediate conditions, on cheek, opercle and ventral portion of head; dark mark on lower opercle and branchiostegal membranes, the degree of development and intensity relative to cheek pigmentation; and the nature of the pigmentation and its intensity on the anal and first and second dorsal fins.

The description of the cephalic sensory pore systems and the cutaneous papillae systems follow Lachner and Karnella (1978, 1980).

Eviota disrupta, new species
Fig. 1

Material examined.—229 specimens from several localities in eastern Oceania; total size range 8.1–16.1 mm; no gravid females found.

Holotype.—USNM 220912, (15.4), male; Society Is., Bora-Bora, south edge of Passe Teavanui, 6 Apr. 1970, C. L. Smith and R. Mathews, S70-13.

Paratypes.—All paratypes from same collection as holotype, originally consisting of 181 specimens (AMNH), distributed as follows: USNM 220567, 60 (8.8–16.1). ANSP 143060, 5 (12.9–15.3). AMS I.21421-001, 5 (11.1–14.8). BPBM 22891, 5 (11.8–15.3). CAS 45395, 5 (11.0–15.4). AMNH 39133, 100 (9.1–16.1).

Nontype material.—SOCIETY ISLANDS: Raiatea: USNM 220571, 1 (11.5). Huahine Nui: USNM 220570, 1 (14.7); AMNH 39134, 1 (14.6), S70-2; AMNH 39136, 1 (13.1), S70-3. Moorea: CAS 45397, 1 (12.5), sta. 67, GVF Reg. 1143; USNM 220569, 1 (12.4); CAS 45401, 4 (11.7–15.4), sta. 20, GVF Reg. 1352; AMNH 39135, 3 (8.1–13.7), S70-64. Maiao: CAS 45409, 2 (12.2, 13.4), sta. 21, GVF Reg. 1353. Tahiti: CAS 45411, 2 (13.3, 15.2), sta. 18, GVF Reg. 1350; CAS 45410, 1 (14.5), sta. 84, GVF Reg. 1160; BPBM

Fig. 1. *Eviota disrupta:* upper, USNM 220912, holotype, male, 15.4 mm SL, Bora-Bora; lower, USNM 220567, paratype, male, 15.3 mm SL, Bora-Bora.

8630, 4 (11.5–14.5). Raroia: CAS 45414, 4 (11.5–12.6), sta. 58, GVF Reg. 112. MANGAREVA: BPBM 13587, 2 (13.4, 13.5); BPBM 13556, 1 (14.7); BPBM 13546, 3 (10.0–11.8); BPBM 13548, 4 (13.9–14.0). SAMOA ISLANDS: Tutuila: USNM 220996, 10 (11.2–14.4); BPBM 11309, 1 (12.3). TONGA ISLANDS: USNM 220565, 1 (13.2), *Te Vega* Cr. 7, sta. 301.

Diagnosis.—Base of pectoral fin with two sharply defined, circular dark spots, clearly separated, of about equal size; pectoral spots intensely pigmented, more so than trunk bars; head (dorsally) and nape with large dark spots, usually arranged transversely and discontinuous along dorsal midline; trunk with dark, discretely outlined, vertical bars, some of which are almost always irregularly broken into elongate, oval or oblong shaped marks on the anterolateral portion of the body; trunk bars extending ventrally below midside of body and often discontinuous over dorsal midline on anterior part of trunk; scale pockets on trunk not pigmented.

Description.—Dorsal fin VI-I,8(1), VI-I,9(*14*); anal fin I,7(1), I,8(*14*); pectoral fin 16(4), 17(*11*); pelvic fin I,4(*14*); fourth ray of pelvic fin with 8–11 branches, average 9.4; number of segments between consecutive branches of fourth pelvic fin ray 0–2, average 1.1; pelvic fin membrane reduced; branched caudal fin rays 11(1), 12(3), 13(*4*), 14(1); segmented caudal fin rays 16(1), 17(*14*); scales highly deciduous, lateral scale rows 23(1), 24(1), 25(1); transverse scale rows 8(1); breast scaleless.

Spinous dorsal fin not elongate. Depressed pelvic fin rarely extending to origin of anal fin, never beyond.

Cephalic sensory pore system is pattern 1; cutaneous papillae system is pattern A.

Male genital papilla not fimbriate.

Vertebrae 10(7) precaudal, 16(7) caudal, total 26(7).

Color in preservative.—This species is similar in general color pattern to *E. fasciola* and *E. irrasa* except for the following characters: the pectoral base almost always has two discrete dark circular spots, the upper one larger or equal to the lower spot, and the spots are the most intense body pigmentation; in a few specimens the pectoral spots are weakly connected by less dense chromatophores; first and third transverse nape bars anterior to the dorsal fin origin are frequently separated along the midline forming spots laterally, the second bar often short and continuous over dorsal midline; trunk bars discretely outlined, irregularly interrupted anteriorly forming elongate vertical marks, and more regular posteriorly; bars usually extending below lateral midline, and sometimes discontinuous over dorsal midline; trunk bars sometimes with less dense or pale interiors; dark spot on lower opercle and branchiostegal membrane is conspicuous and often divided into two parts or nearly so; a small, sixth subcutaneous ventral midline spot may be present at the base of the procurrent caudal fin rays, but is never associated with a subcutaneous bar.

Color in life.—The following observations on color of a living specimen from Samoa (USNM 220996) were recorded by R. Wass: body greenish-yellow, operculum bluish-green, bars and spots brown.

Geographic distribution.—This species occurs in eastern Oceania (Figure 6) from the Samoa and Tonga Islands eastward to Mangareva.

Etymology.—The specific epithet, *disrupta* is Latin, meaning "broken up," in reference to the pattern of the vertical trunk bars.

Eviota fasciola, new species
Figs. 2 and 3

Material examined.—345 specimens from the Great Barrier Reef, Australia, and numerous localities in western Oceania; total size range 7.8–19.1 mm; smallest gravid female 13.6 mm SL.

Holotype.—USNM 220560, (18.0), male; One Tree Island, Queensland, Australia, 22 Nov. 1966, V. G. Springer, 66-7.

Paratypes.—All paratypes were collected from the Great Barrier Reef, Queensland, Australia. ONE TREE ISLAND: USNM 220564, 25 (10.2–19.1); CAS 45396, 5 (12.5–17.7); WAM P26843-001, 5 (11.2–16.8); previous three lots from same collection as holotype. USNM 220563, 31 (11.4–18.0), VGS 66-16; AMS I.15641-049, 1 (17.5). HERON ISLAND: LACM 32820-8,

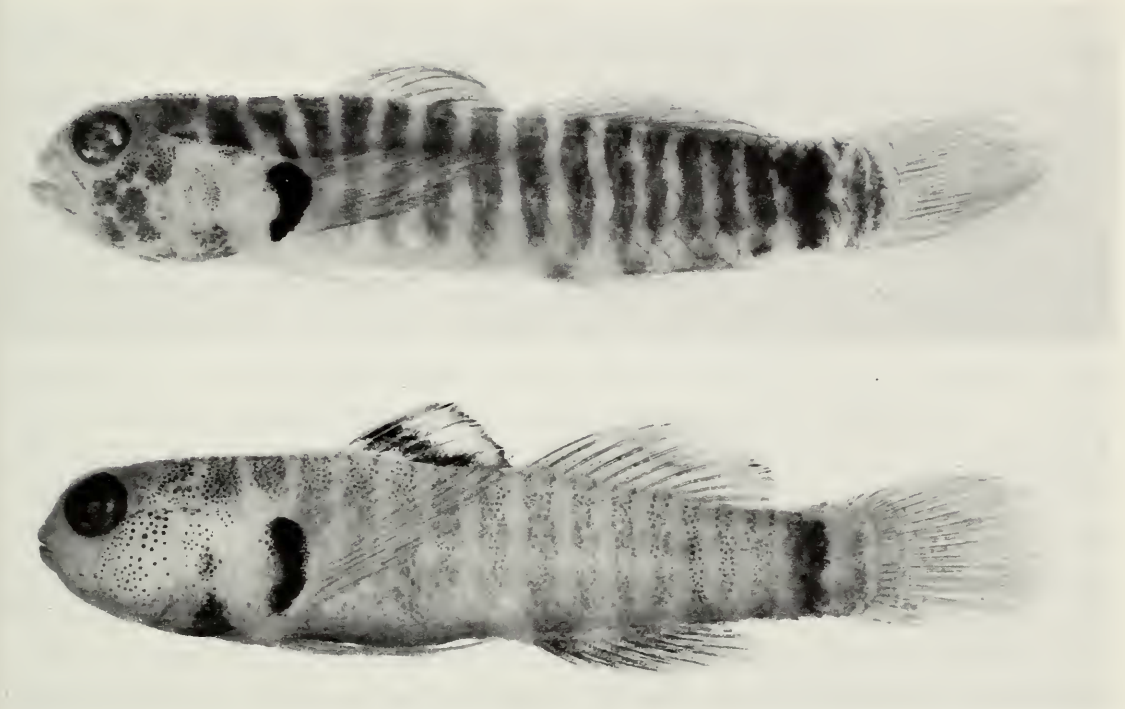

Fig. 2. *Eviota fasciola:* upper, USNM 220560, holotype, male, 18.0 mm SL, One Tree Island; lower, USNM 220559, paratype, female, 13.5 mm SL, Lizard Island.

2 (16.4–16.5). ENDEAVOUR REEF (collected by J. Tyler and C. L. Smith in 1969): ANSP 143059, 4 (13.5–15.3), TS,A-17; ANSP 143058, 11 (10.5–15.4), TS,A-13; ANSP 143057, 1 (12.4), TS,A-6; AMNH 39132, 1 (13.6), S69-19; LIZARD ISLAND (collected by Australian Museum team in 1975): AMS I.21422-001, 15 (10.2–17.6), DFH 75-14; AMS I.19473-177, 103 (9.3–16.9), LZ 75-60; USNM 220559, 11 (11.8–16.5), LZ 75-70; USNM 220955, 3 (10.4–12.4), LZ 75-17; AMS I.19483-071, 76 (10.2–17.8), LZ 75-71.

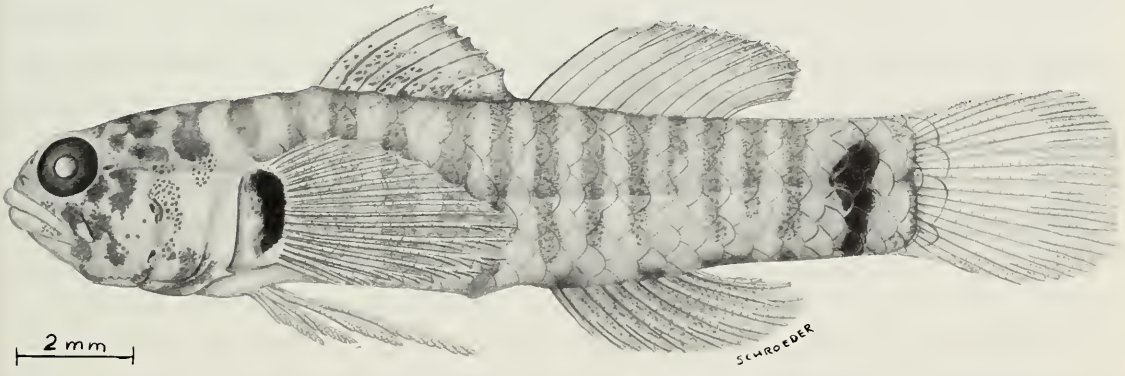

Fig. 3. *Eviota fasciola,* ANSP 143059, paratype, male, 15.3 mm SL, Endeavour Reef. (Drawn by J. R. Schroeder)

Other material.—PALAU ISLANDS: CAS 45407, 1 (12.1), Ngadarak Reef, sta. 106, GVF Reg. 612. ULITHI ATOLL: CAS 45400, 7 (11.5–13.8), sta. 178, GVF Reg. 975; CAS 45403, 10 (10.1–13.4), sta. 181, GVF Reg. 978; CAS 45412, 4 (11.5–12.9), sta. 179, GVF Reg. 976. IFALUK ATOLL: CAS 45402, 2 (11.9–12.5), sta. 76, GVF Reg. 379; CAS 45406, 1 (11.3), sta. 7, GVF Reg. 128; CAS 45413, 1 (9.1), sta. 109, GVF Reg. 230. MARIANAS ISLANDS: Saipan: CAS 45405, 7 (11.1–14.9), sta. 47, GVF Reg. 833; CAS 45399, 14 (9.2–16.0), sta. 46, GVF Reg. 832. USNM 149916, 13 (8.9–14.6); USNM 150022, 1 (12.0). Guam: CAS 45398, 8 (8.6–14.7), sta. 59-28, GVF Reg. 1856; UG 4512, 10 (8.7–15.6). AMS 18403-001, 2 (14.1, 15.3). MARSHALL ISLANDS: Enewetak Atoll: AMS I.18405-001, 1 (14.7); AMS 18401-003, 1 (14.5); USNM 220558, 2 (12.9, 13.7); BPBM 8241, 2 (13.5, 14.8); USNM 220562, 3 (13.3–14.7); LACM W63-281-2, 1 (14.8); LACM 6679-61, 6 (8.7–15.3); USNM 220568, 4 (10.4–15.5); LACM W63-283-4, 2 (10.9, 14.5). Majuro Atoll: AMS I.18399-001, 1 (14.0). GILBERT ISLANDS: Abaiang Atoll: AMS I.18052-001, 15 (8.9–15.5). TROBRIAND ISLANDS: AMS I.17102-052, 1 (15.4); USNM 220561, 2 (10.6, 14.2).

Tentative identifications.—KAPINGAMARANGI ATOLL: CAS 45408, 10 (7.8–11.9), sta. 62, GVF Reg. 365; CAS 45404, 2 (9.1, 9.5), sta. 8, GVF Reg. 311.

Diagnosis.—Base of pectoral fin with large dark kidney shaped to semicircular mark; intensity of pectoral mark greater than that of trunk bars; head (dorsally) and nape with dark transverse bars, usually complete over dorsal midline, occasionally one or more bars broken up into spots laterally, and about one-half of the specimens with spots or bars darker laterally than dorsally; trunk with prominent dark, discrete vertical bars, descending to ventral portion of body and continuous over dorsal midline; scale pockets on trunk not pigmented.

Description.—Dorsal fin VI-I,8(3), VI-I,9(*15*); anal fin I,8(*17*), I,9(1); pectoral fin 16(*7*), 17(11); pelvic fin I,4(*19*); fourth ray of pelvic fin with 6–12 branches, average 9.1; number of segments between consecutive branches of the fourth pelvic fin ray 0–2, average 1.1; pelvic fin membrane reduced; branched caudal fin rays 11(3), 12(*6*), 13(3); segmented caudal fin rays 17(*17*); lateral scale rows 23(1), 24(5), 25(*1*); transverse scale rows 6(*3*); breast scaleless.

Spinous dorsal fin not elongate. Depressed pelvic fin usually not extending to origin of anal fin, never beyond it.

Cephalic sensory pore system is pattern 1; cutaneous papillae system is pattern A.

Male genital papilla not fimbriate.

Vertebrae 10(*9*) precaudal, 16(*8*), 17(1) caudal, total 26(*8*), 27(1).

Color in preservative.—Specimens from Australia almost always have an intensely pigmented kidney-shaped spot, rarely a semicircular spot, extend-

ing over the height of the pectoral base, the upper portion usually wider. The pectoral spot is the most prominent mark on the body. In a few of the type specimens the pectoral spot is more heavily pigmented on the upper and lower portions than the middle portion, and rarely the mark is divided into upper and lower spots on specimens from Lizard Island. A pale area almost always lacking chromatophores is present on anterior part of base of pectoral fin and posterior portion of opercle. A dark circular spot occurs on the upper portion of the mesial surface of base of the pectoral fin. Head and trunk with prominent vertical dark bars, usually wider than the pale interspaces; 12–13 trunk bars from origin of spinous dorsal fin to midpeduncular spot, extending from dorsal midline to ventral portion of trunk, the last bar overlying the dark subcutaneous peduncle spot. Usually a small dark spot bordering upper procurrent rays just posterior to last bar and two narrow vertical bars at base caudal fin, the posterior one on bases of caudal fin rays; spot and bars are often undeveloped. The trunk bars may be reduced in size and intensity in some specimens, or they may have pale interiors, and the trunk pigmentation occasionally may be obscure, but the head and pectoral base marks persist. Three dark transverse bars on nape anterior to the origin of the spinous dorsal fin; a fourth, the anteriormost bar on the occipital area, usually present but often more irregular than other bars on nape and sometimes segmented into patches laterally and dorsally along the midline. A dark triangular mark is present immediately above and behind the eyes. One or more of the nape bars may be broken into spots and/or intensely pigmented laterally. Cheek with 6–7 large patches of chromatophores, a large diffuse patch on anterior part of opercle and a heavily pigmented patch on lower margin of opercle and overlapping branchiostegal membrane. Cheek, opercle and branchiostegal patches may be irregularly arranged in some specimens. Lower part of head and chin with patches of chromatophores similar to those on cheek. Five subcutaneous spots on ventral midline from origin of anal fin to end of caudal peduncle, associated with subcutaneous bars on lower part of trunk; bars absent from upper part of trunk. The fifth spot and lower subcutaneous bar are continuous with the caudal peduncle spot. Fins of the Australian specimens often pale, lacking prominent coloration. Spinous dorsal fin pale or with a diffuse dusky oblique band through the lower portion, the anterior basal portion, as well as the outer half, pale or dusky to brown, the margin sometimes darker. Second dorsal and anal fins dusky to pale. The remaining fins may have the rays bordered with fine chromatophores, otherwise they are pale.

The specimens from Trobriand Islands have a semicircular spot at the base of the pectoral fin, the anterior margin of which is nearly vertical. The nape and trunk bars may be discontinous along the dorsal midline.

Specimens from western Oceania, from the Palau to the Gilbert Islands (Fig. 6), have a more variable shaped pectoral spot, ranging from semicir-

cular or oblong to somewhat kidney shaped; a specimen from the Gilbert Islands has the upper and lower portions of the spot enlarged with a central constriction, suggesting a two-spotted condition. The pectoral spot is less intense than in the Australian specimens, often equal in intensity to the trunk bars.

The only sexual dimorphism in coloration observed was that the females may be slightly paler.

Geographic distribution.—This species occurs in western Oceania from the Palau to the Gilbert Islands, the Trobriand Islands, and the Great Barrier Reef (Fig. 6).

Etymology.—The specific epithet is taken from the Latin word *fascia,* in reference to the bands nearly encircling the trunk.

Eviota irrasa, new species
Figs. 4 and 5

Material examined.—7 specimens from the Philippine Islands; total size range 12.3–17.6 mm; no gravid females found.

Holotype.—USNM 220566, (16.0), male; Philippine Is., Palawan Prov., Cocoro I. (Cuyo Is.); 25 May 1978, V. G. Springer and Smithsonian team, SP 78-26.

Paratypes.—USNM 220954, 5 (12.3–17.6); data as for holotype. USNM 220582, 1 (17.4), Philippine Is., Palawan Prov., Putic I. (Cuyo Is.), 22 May 1978, V. G. Springer and Smithsonian team SP 78-18.

Diagnosis.—Base of pectoral fin with two dark circular to oval spots, not sharply defined and often weakly connected, the upper spot somewhat larger than the lower; pectoral spots moderately pigmented, the intensity about equal to trunk bars; head (dorsally) and nape with dark, transverse bars continuous over dorsal midline, and somewhat more heavily pigmented laterally; trunk with regular dark, vertical bars, somewhat diffuse in outline, continuous over dorsal midline and usually not extending below midside anteriorly and much shorter posteriorly on peduncle; scale pockets dorsolaterally on trunk often weakly pigmented.

Description.—Dorsal fin VI-I,9(*7*); anal fin I,8(*7*); pectoral fin 16(*3*), 17(4); pelvic fin I,4(*7*); fourth ray of pelvic fin with 8–11 branches, average 9.9; number of segments between consecutive branches of fourth pelvic fin ray 1–2, average 1.2; pelvic fin membrane reduced; branched caudal fin rays 12(1), 13(1); segmented caudal fin rays 16(1), 17(*6*); lateral scale rows 24(2); transverse scale rows 6(1); breast scaleless.

Spinous dorsal fin not elongate. Depressed pelvic fin rarely extending to origin of anal fin, never beyond.

Cephalic sensory pore system is pattern 1; cutaneous papillae system is pattern A.

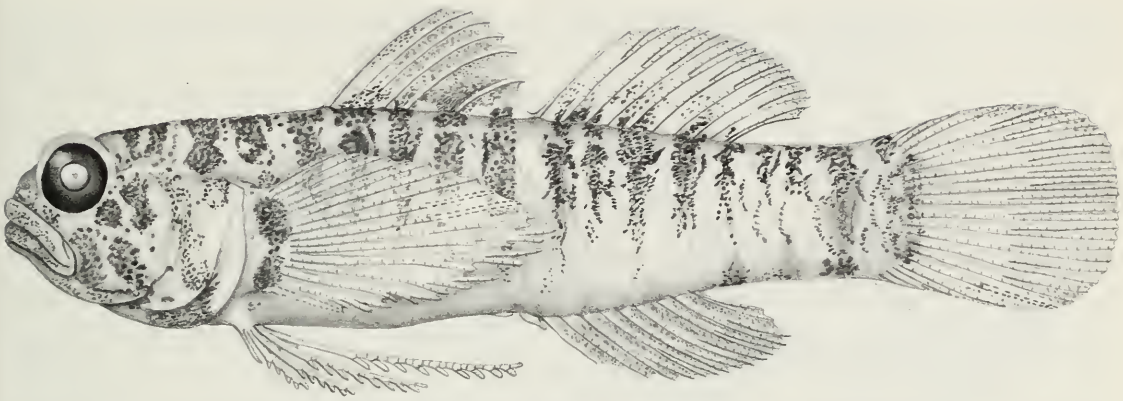

Fig. 4. *Eviota irrasa,* USNM 220566, holotype, male, 16.0 mm SL, Cuyo Islands. (Drawn by J. R. Schroeder)

Male genital papilla not fimbriate. Vertebrae 10(6) precaudal, 16(6) caudal, total 26(6).

Color in preservative.—This species is similar in the general color pattern to *E. fasciola* and *E. disrupta*. It differs in the following characters: *E. irrasa* has upper and lower dark, circular to oval, pectoral base spots that may be joined by scattered chromatophores, the upper spot somewhat larger; nape bars rarely broken up into spots; trunk bars mostly confined to dorsolateral portion, only the anterior bars extending to ventral area, the bars becoming shorter posteriorly and occurring only dorsolaterally; trunk bars sometimes diffuse, the pigmentation becoming irregular and outlining some of the scale pockets; dorsal and anal fins darker than in *E. fasciola,* the oblique band in the spinous dorsal fin dusky to black, wide, and some specimens with small intense black areas on membrane in middle portion of fin just posterior to first spine and in an oblique row following the next 3–4 spines; trunk bars may extend into basal portions of first and second dorsal fins; anal fin dusky to blackish.

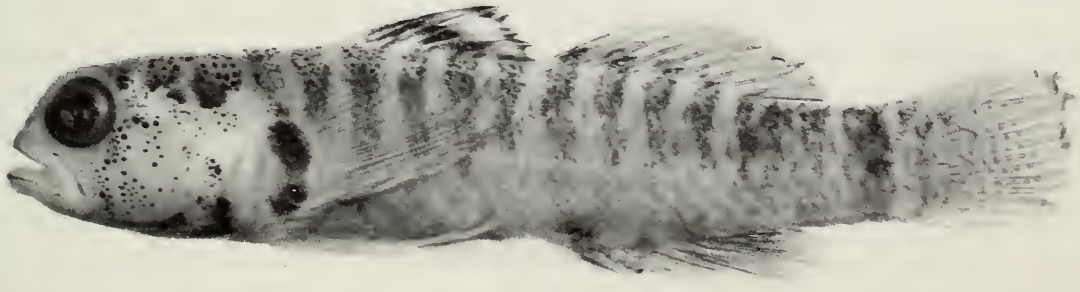

Fig. 5. *Eviota irrasa,* USNM 220954, paratype, female, 14.0 mm SL, Cuyo Islands.

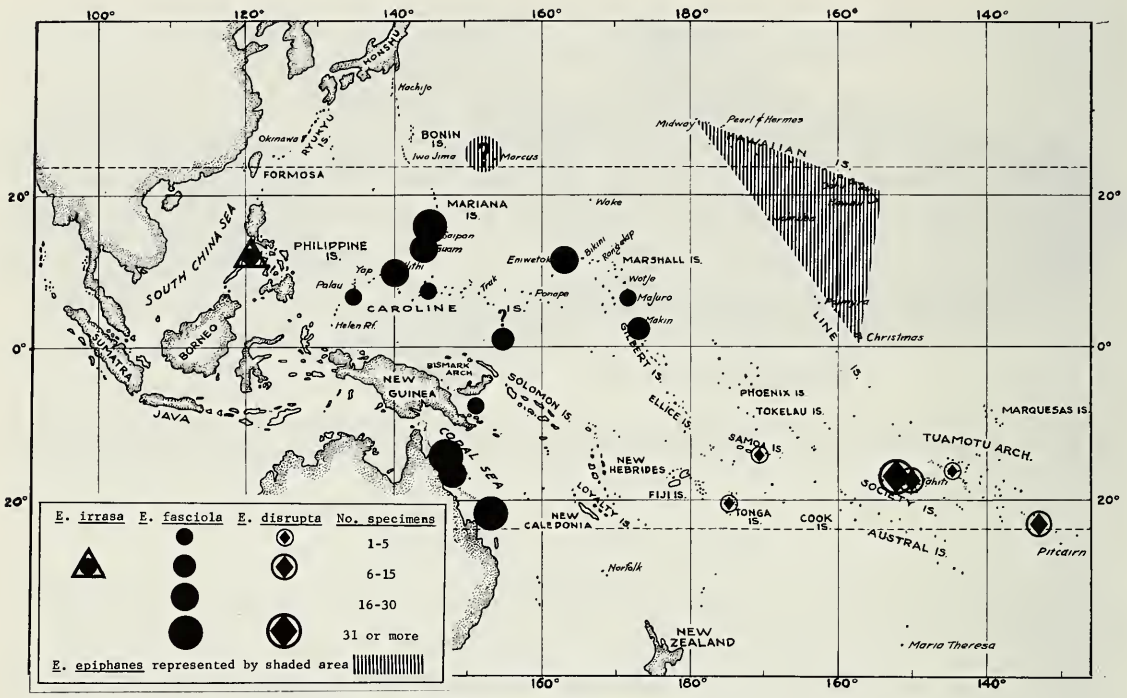

Fig. 6. Geographic distributions of *Eviota fasciola, E. disrupta, E. irrasa,* and *E. epiphanes,* based on material examined.

Geographic distribution.—Known only from the Cuyo Islands, Palawan Province, Philippine Islands (Fig. 6).

Etymology.—The specific name *irrasa* is Latin, meaning unpolished or unshaved, and is used in reference to the indiscrete nature of the pigmentation pattern of the head and trunk compared with *E. fasciola* and *E. disrupta*.

Discussion

Although *Eviota epiphanes, E. disrupta, E. fasciola,* and *E. irrasa* are superficially similar in many aspects, certain color marks are consistently different. The salient differences among these species are summarized in Table 1. No evidence of intergradation of these species is shown in our data. The four species occur in distinct geographical areas and are not so far known to be sympatric (Fig. 6). Because of the poor state of preservation of the specimens from Marcus Island (BPBM 7154, 23 spec.; BPBM 7155, 4 spec.) we identify these only tentatively as *E. epiphanes*.

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